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China Emissions Trading System - A new dawn

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Executive summary

- The advent of China's Emission Trading Scheme (ETS) will bring direct carbon costs to high emission sectors in China and create the world's largest carbon market.
- Initial impact is expected to be limited given low bars, and we expect a more material impact by the middle of this decade as China focuses on peaking emissions in that timeframe.
- Our scenario analysis finds that the implementation of the ETS has the potential to reduce China's carbon emissions by 2060 by 6GT/yr in the high case (60% of 2020 emissions) and by 3GT/yr in the low case (30% of 2020 emissions).
- Utilities is the first sector impacted; As the next largest emitters, we expect steel, cement, chemicals and aluminium to follow.
- This study assesses these five sectors in detail, examining their industry structures, decarbonisation pathways, company developments and scenario analysis of potential outcomes.
- We find chemicals (from coal), utilities and cement to be most impacted, followed by aluminium and steel.
- Our scenario analysis indicates that a USD10/t carbon price would impact 2020 revenue of these sectors by 2-36% and the 2020 net profit of listed companies by 13-910%.
- The high burden of decarbonisation will require public support while also driving industry consolidation and shifting cost curves, resulting in a host of investment implications for sectors and companies.

Development of China ETS

On 1 February 2021, the national carbon ETS was entered into force by China's Ministry of Ecology and Environment (MEE). It brings together eight pilot programs that had begun since 2013 in five municipalities (Beijing, Shanghai, Tianjin, Chongqing and Shenzhen) and three provinces (Hubei, Guangdong and Fujian).

Trading on the ETS commenced on 16 July 2021, and is being managed by the Shanghai Environment and Energy Exchange. The first trading day of the carbon emission allowances (CEA) concluded with a closing price of RMB51.2/t (USD7.9/t) and total turnover of RMB210m (USD32.4m). CEA prices have subsequently risen to RMB56.9/t (USD8.8/t) on 23 July 2021.

At present, the ETS regulates more than 2,200 companies from the power sector (including combined heat and power, as well as captive power plants of other sectors), which emit more than 26,000 tCO₂ per year. In total, this national ETS is estimated to cover more than four billion tCO₂, accounting for around 40% of national carbon emissions.

The system's scope is to be further expanded in the future to cover seven other sectors, including petrochemicals, chemicals, building materials, steel, nonferrous metals,

paper and domestic aviation. There is no specific timeline for this expansion yet.

China has opted for an intensity-based target to cut emissions per unit of GDP. Plants that meet the benchmarks will initially receive all the free allowances they need to cover their emissions. Plants that do not reach the benchmark will receive fewer allowances than they need and will have to reduce their emissions or buy additional allowances to cover their emissions. There are plans to gradually move towards auctioning of all allocations as the scheme develops.

This system rewards companies for producing less emissions per unit of output alleviating concerns about constraining economic growth although this means that emissions could in theory still rise.

Companies included in the ETS are required to compile and submit their greenhouse gas emissions report to the MEE before 31 March each year. These reports will be made public regularly and subject to oversight of the provincial department of the MEE, which will organise their verification, whose costs will be paid for and verifiers appointed by the MEE.

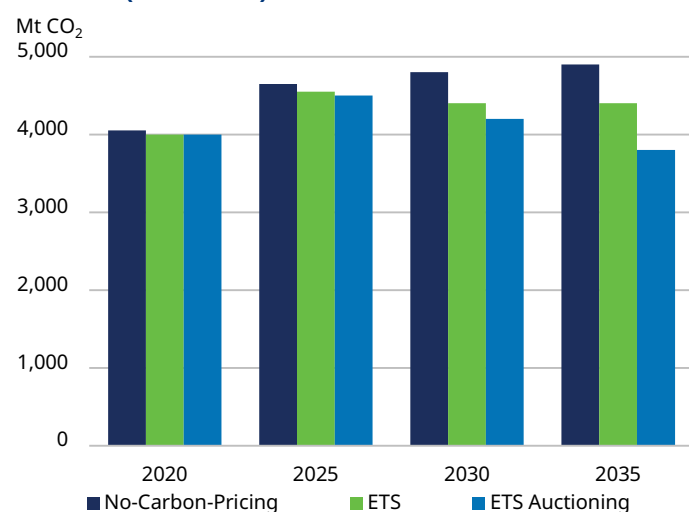


Quantifying the potential for emissions reduction

The launch of China's ETS in 2021 is a momentous event and likely to eventually lead to the formation of the world's largest carbon market. However, at this stage, it is difficult to accurately estimate its scope for reducing carbon emissions given its initial limited scope (only covering utilities), generous benchmarks and award of free allowances.

In [this report](#) published in April 2021, the IEA found that the adoption of more stringent benchmarks and introduction of allowance auctions could help power sector emissions to peak before 2030 and reduce coal's share of the generation mix to 50% or less by 2035.

Figure 1: China utilities carbon emissions by scenario (2020–2035)

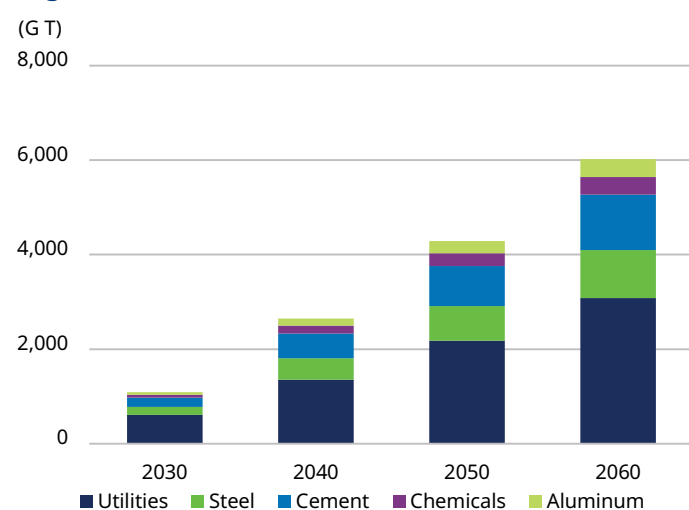


Source: IEA.

Our analysis of China's reduction in carbon emissions due to the ETS indicates that it could reduce total carbon emissions in 2060 by 3GT/yr in a low case and by 6GT/yr in a high case, on the basis of the following assumptions:

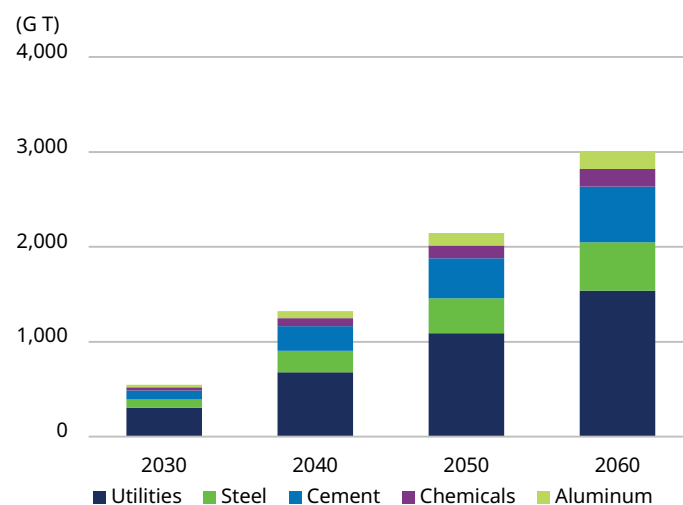
- A straight-line reduction in sector intensity caps from current levels to zero by 2060.

Figure 2: China potential ETS emissions reduction (high case)



Source: AIGCC estimates.

Figure 3: China potential ETS emissions reduction (low case)

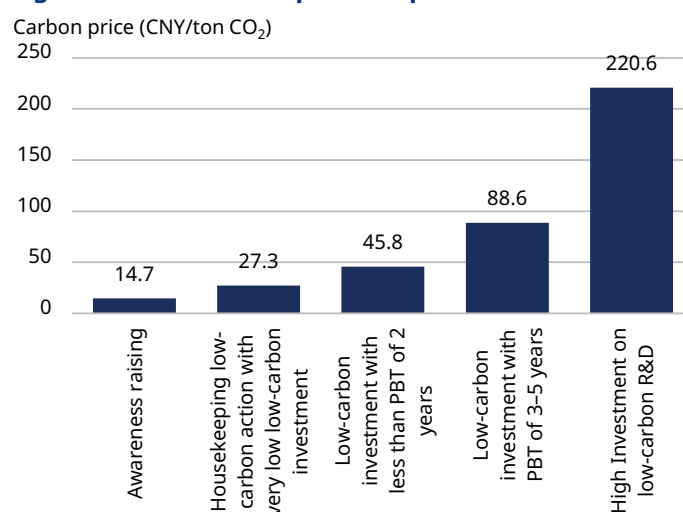


Source: AIGCC estimates.

- The inclusion of the utilities sector from 2021 onwards and the remaining four key sectors (steel, cement, chemicals and aluminum) from 2025 onwards.
- Low growth levels of absolute production for power and aluminium (0.5% CAGR 2021-2060) and flat growth for the remaining sectors.
- Assuming a carbon inhibition factor of 0.6x in the high case and 0.3x in the low case. The factor of 0.6x is derived from this [Sustainability report](#) which showed that China's pilot ETS had produced a 60% carbon emission inhibition effect.

From another perspective, this report in [Low Carbon Economy](#) estimates that the ETS would only contribute to material low carbon investment when the carbon price is more than RMB89/t of CO₂ (USD14/t) and a high level of low carbon investment would require carbon prices of above RM220/t of CO₂ (USD34/t).

Figure 4: China carbon prices vs probable carbon actions



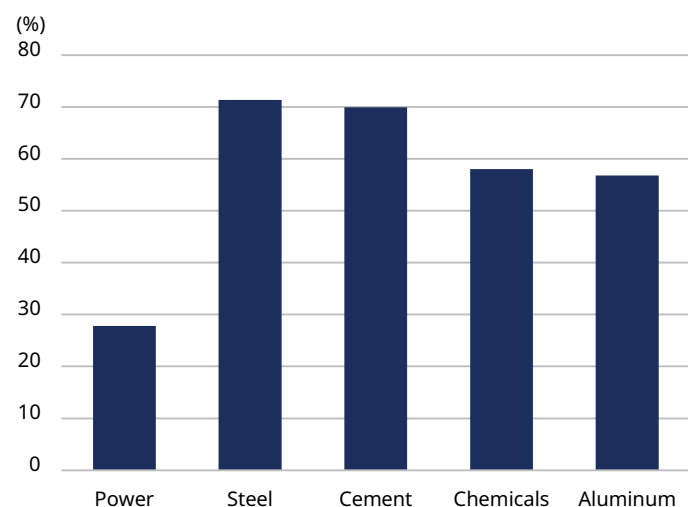
Source: Low Carbon Economy.

Overview of China carbon emissions by sector

China is the world's largest emitter of CO₂ globally, accounting for 28% of global CO₂ emissions in 2019 (c10GT), while being ranked 47th globally in terms of emissions per capita. China's absolute CO₂ emissions are so large due to its high share of fossil fuel power generation and heavy manufacturing, as it produces over 50% of global coal-fired power as well as materials such as steel, cement, chemicals and aluminum.

Based on 2020 production and our estimates of average CO₂ intensity of production by sectors based on disclosures by public listed companies, we estimate utilities to be the highest CO₂ emitting sector (39% share), followed by steel (18%), cement (17%), transport fuel (7%) and coal-chemicals (6%).

Figure 5: China's share of global production (2020)

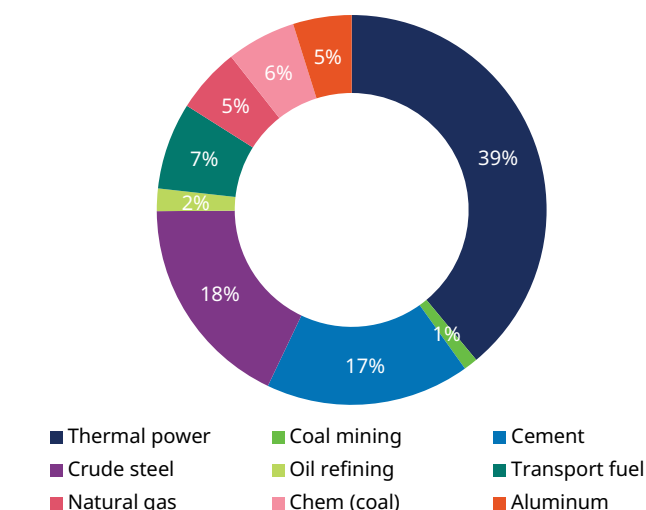


Source: NBS, AIGCC estimates.

The sector with the highest carbon intensity per unit of output is aluminum at 14t CO₂/t followed by coal-chemicals at 4t CO₂/t with the carbon intensity of the remaining sectors ranging from 0.3 – 2.2t CO₂/t.

In terms of measuring sectoral carbon intensity by revenue, which is an indication of the sensitivity of company earnings to carbon pricing, we find coal-chemicals to be

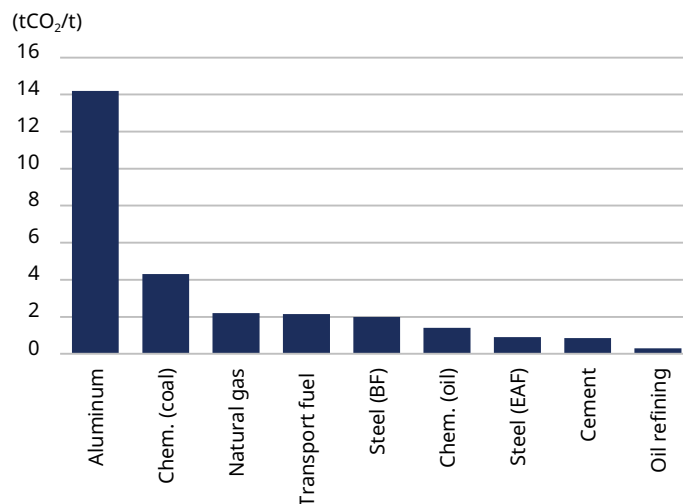
Figure 6: China's carbon emissions by sector (2020)



Source: NBS, AIGCC estimates.

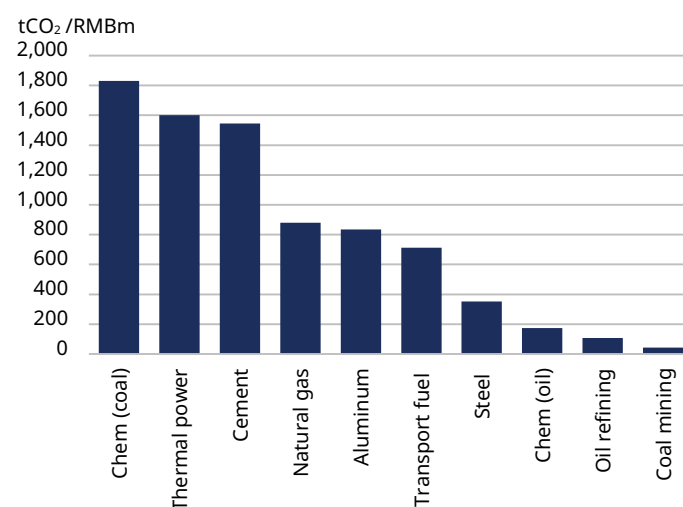
most significantly affected, followed by power, cement, natural gas, aluminium and transport fuels. As natural gas and transport fuels are mainly Scope 3 emissions, we do not expect their carbon costs to significantly increase.

Figure 7: China's carbon intensity per output by sector (2020)



Source: NBS, AIGCC estimates.

Figure 8: China's carbon intensity per revenue by sector (2020)



Source: NBS, AIGCC estimates.

In the following section, we proceed to examine five key sectors in detail – utilities, steel, aluminium, chemicals and cement – to assess how the forthcoming ETS is likely to affect sector dynamics and the potential company implications.



Background

Figure 9: Utilities key indicators (2020)

Revenue (RMB tr)	Profits (RMB tr)	Emissions (G T)
8.08	0.52	4.22

Source: China National Bureau of Statistics.

In 2020, China generated 7,624 TWh of electricity, of which 2,215TWh was renewable electricity (+8% y-y) accounting for 30% of total generation. China's hydropower generation holds the greatest share among the renewables at 18% of overall power output, followed by wind (6%), solar (3%) and biomass (2%). Thermal power is the largest source of power generation (66%) with the remainder coming from nuclear (5%).

Figure 10: China electricity capacity, output by sector

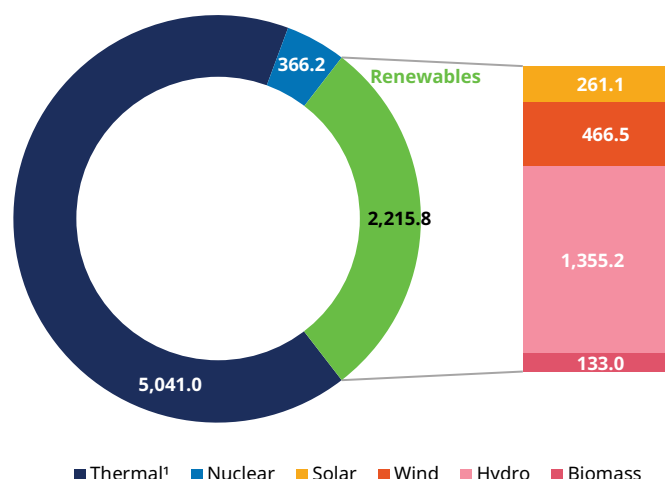
Power generation					
	2019 (TWh)	Share (%)	2020 (TWh)	Share (%)	% change
Thermal power ¹	4,934	67	5,041	66	2.2
Hydropower	1,302	18	1,355	18	4.1
Wind power	405	6	467	6	15.1
Solar power	224	3	261	3	16.6
Biomass	113	1	133	2	17.7
Nuclear power	349	5	366	5	5.0
Total	7,327		7,624		4.1

Installed capacity					
	2019 (GW)	Share (%)	2020 (GW)	Share (%)	% change
Thermal power ¹	1,166	58	1,215.7	55	4.3
Hydropower	358	18	370.2	17	3.4
Wind power	209.2	10	281.5	13	34.6
Solar power	204.2	10	253.4	12	24.1
Biomass	23.6	1	29.5	1	25
Nuclear power	48.7	3	49.9	2	2.4
Total	2,010.1		2,200.6		9.5

¹Thermal power generation includes coal, gas and oil.

Source: China Electricity Council, China Energy Portal.

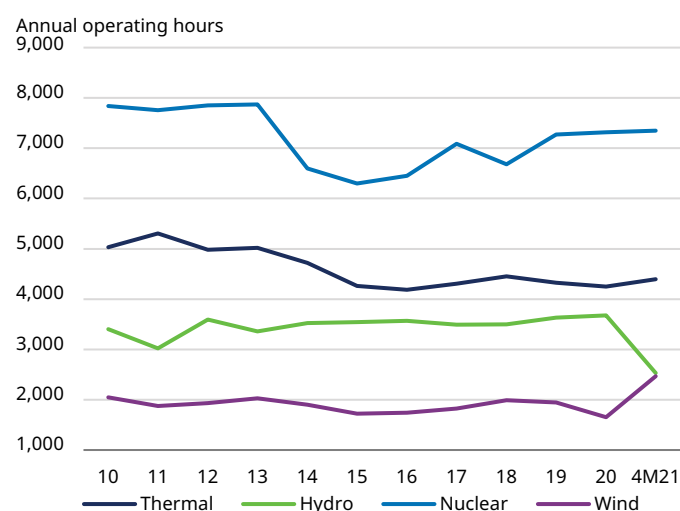
Figure 11: China's electricity mix 2020



¹Thermal power generation includes coal, gas and oil.

Source: China Electricity Council, China Energy Portal and Argus media publication.

Figure 12: Average annual power plant operating hours in China



Source: NBS.

Following the announcement of China's climate targets, the five major power producers of China have started to provide more details on how they plan to align to the goals and their respective targets.

Figure 13: Summary table of climate targets and plans by major power producers in China

5 major power producers in China	Climate targets and plans
China Huadian Group	<ul style="list-style-type: none"> Close more than 3 GW of coal-fired power capacity in the next 5 years To add 75 GW renewable power capacity over 2021–2025 To peak carbon emissions by 2025 To raise non-fossil fuel to 50% of total power generation capacity by 2025 and non-coal power (renewable fuels plus gas) to 60%
China Huaneng Group	<ul style="list-style-type: none"> To develop more than 80GW of additional clean energy power capacity by the end of 2025, making clean energy to account for more than 50% of company's total installed generation capacity To boost share of clean energy capacity to 75% of total installed capacity by the end of 2035
China Datang	<ul style="list-style-type: none"> To raise the share of non-fossil capacity to over 50% from 2021–2025
State Power Investment Corporation (SPIC)	<ul style="list-style-type: none"> Will peak its carbon emissions by 2023, which is seven years ahead of the national carbon peak pledge Aim for “clean” electricity to account for 50% of its total transmitted volume by 2025
China Energy Investment Corporation (CEIC)	<ul style="list-style-type: none"> To add 70-80GW of renewable capacity in 2021–2025

Source: Companies, Argus.

The [Chinese government has shown commitment to permanently close inefficient coal-based power generation capacity](#). In 2020, their target was to phase out 7GW of coal power capacity, though the goal appears to be lower than the 2019 target of 9GW. However, it is worth noting that despite China's efforts to reduce inefficient coal power capacity, they are simultaneously building more efficient plants with lower emissions. In 2019, China have added a net 30GW of coal-fired power capacity.

We expect the Chinese government to reveal more concrete details regarding its renewable energy plans in 2H21. Presently, the National Energy Administration (NEA) plans to have [renewable power to account for over half of total installed capacity](#) by 2025 and [increase the share of solar and wind-based power generation](#) to 11% of overall power generation in 2021 and 17% by 2025.

ETS developments

The utilities sector is the first sector to be included in the ETS, with encompassing more than 2,200 companies from the power sector. Benchmarking is used as the main allocation method, with four distinct benchmarks: conventional coal plants below 300 MW; conventional coal plants above 300 MW; unconventional coal; and natural gas.

At first, entities will receive carbon emission allowances (CEAs) at 70% of their 2018 output multiplied by the corresponding benchmark factor. Allocation will be adjusted later to reflect actual generation in 2019 and 2020. A unit load (output) adjustment factor distributes more allowances for entities operating at load rates lower than 85%.

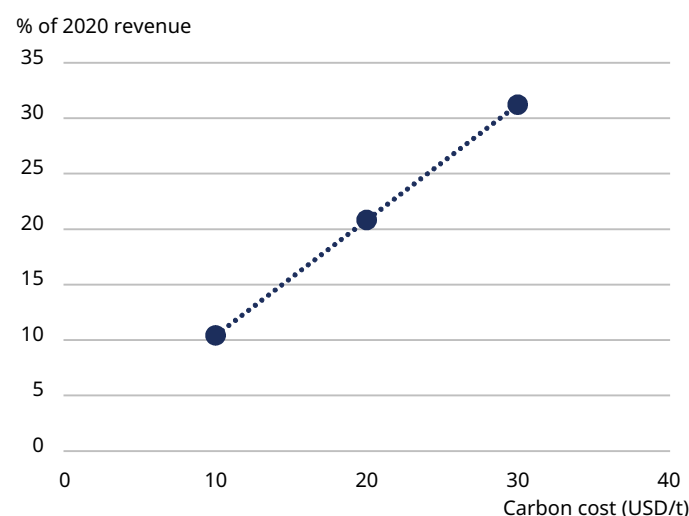
In practise, the current benchmark for power plants over 300MW is set at 0.877tCO₂/MWh. Based on this quota, all Chinese coal plants over 300MW will achieve the carbon intensity requirements without needing to reduce any emissions or purchase additional quota, which suggests that there could be an over allocation of CEAs in the First Compliance Period resulting in surplus CEAs.

For the utility sector, a focus on benchmark emissions rate would place the focus on improving efficiency of existing plants rather than improving the energy structure by replacing coal or gas with cleaner energy sources.

Unlike in most other jurisdictions with carbon pricing, China's electricity prices are currently fixed on an annual basis by the central government, with variations by region. This means that power generation companies cannot pass the carbon price on to consumers.

We estimate the utilities sector to be one of the most exposed sectors to a rising carbon cost and estimate the imposition of each USD10/t to carbon emissions to represent 10% of sector revenue.

Figure 14: China utilities revenue sensitivity to carbon cost (2020)



Source: Companies.

Company implications

In 2021, major Chinese utilities have announced plans to achieve carbon peak by 2025 and large renewables expansion. In most cases, these announcements have been made by the parent company's so the impact on listed companies are not yet known.

Figure 15: Major China utilities decarbonisation announcements

	Unit	Huadian	Huaneng	SPIC	CR Power
Carbon peak	Year	2025	-	2023	2025
RE power addition (by 2025)	GW	75	80	-	40
Coal plant closure (by 2025)	GW	3	-	-	-
Non-fossil fuel gen. share (2025)	%	50	50	-	>50

Source: Companies.

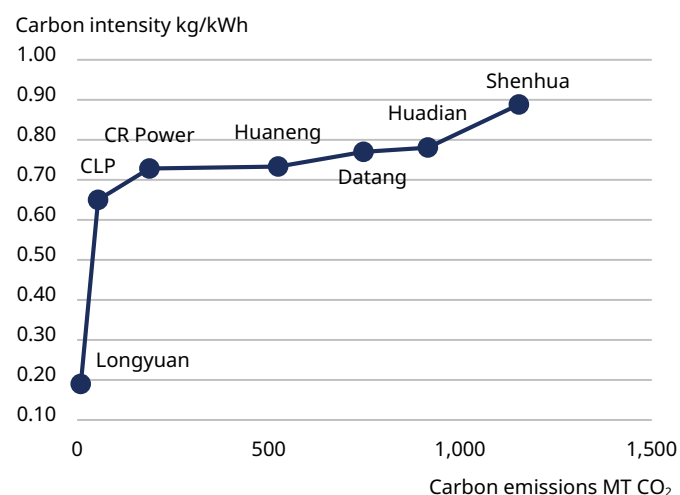
Based on our scenario analysis presented in the table below, we estimate that Huaneng Power, Datang Power and Huadian Power to be the utilities likely to be most financially sensitive to higher carbon costs and CLP, CR Power and Huadian Power to have to bear the highest burden of investment.

Figure 16: China utilities scenario analysis

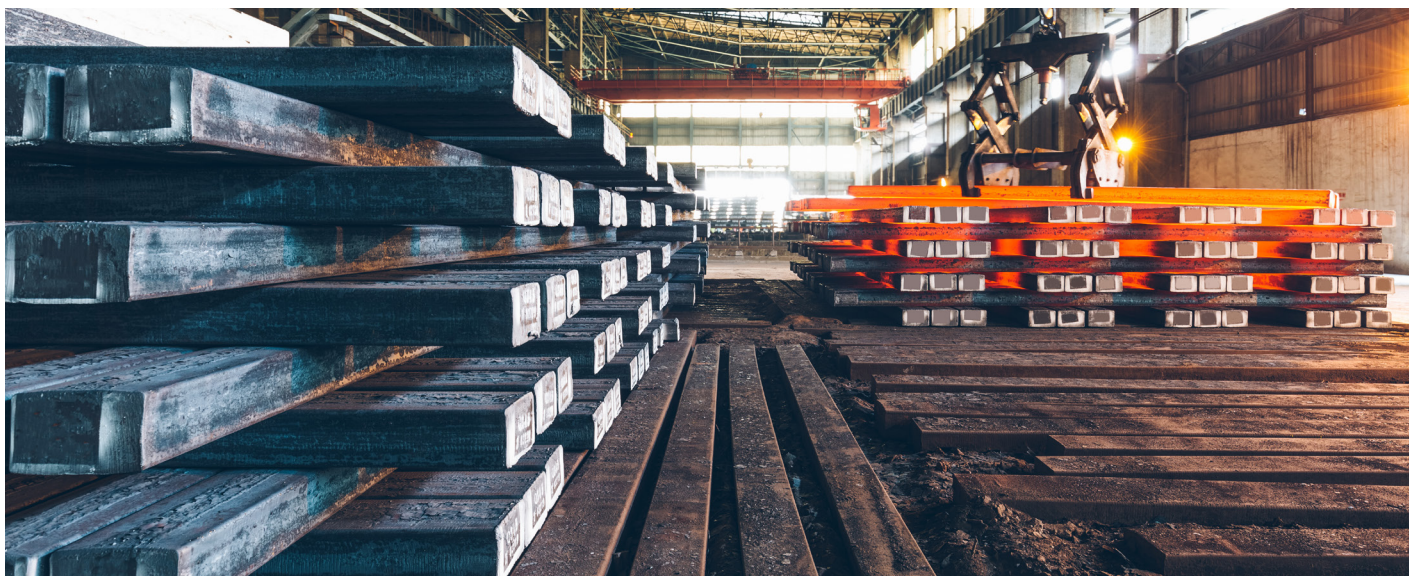
	USD10/t carbon cost impact on 2020 NP %	10GW renewable capex of 2020 OpCF %
China Shenhua	25	7
Huadian Power	262	28
Datang Power	507	22
Huaneng Power	910	14
CR Power	120	28
CLP	30	31

Source: Companies, AIGCC estimates.

Figure 17: China utilities carbon curve (2020)



Source: Companies.



Background

Figure 18: Steel key indicators (2020)

Revenue (RMB tr)	Profits (RMB tr)	Emissions (G T)
4.70	0.21	1.84

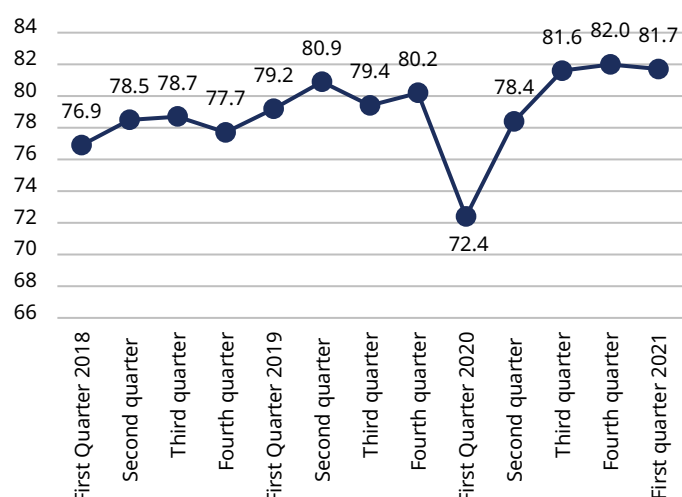
Source: Industry associations.

China's crude steel production in 2020 reached 1,053 Mt, (+5% y-y) due to a quick recovery in construction and manufacturing activity after the pandemic lockdowns. This represents 56.5% of global steel production.

China's consumption of ferrous scrap has increased in recent years (+15% y-y in 2019), though this recycling rate is still comparatively low due to the limited scrap availability in the economy. 90% of the Chinese crude steel production is from Basic Oxygen Furnaces (BOF) while the remaining 10% is generated Electric Arc Furnaces (EAF).

Tighter emissions standards in the Chinese steel industry has seen an increase in scrap inputs in Chinese BOF mills, with the average steel scrap to crude steel ratio at 20% in 2019, accounting for 113 Mt of steel scrap consumption.

Figure 19: Quarterly utilisation rate of the ferrous metal smelting and pressing industry



Source: NBA.

This has limited the availability of ferrous scrap, causing Chinese EAF production to decrease by 15% to 103 Mt in the same year. In 1Q21, the [utilisation rate](#) of the ferrous metal smelting and processing industry was 82%, a 9ppt increase y-y.

To increase the use of scrap steel, China recently lifted the 2018 ban on scrap steel to prevent the global dumping of low-grade scrap "waste". China's state administration for market regulation issued a [new standard on "Recycling Steel and Iron Raw Materials"](#) which seeks to clarify which groups of scrap metal is eligible for import by Chinese buyers and the full inspection and customs boundaries in which they must operate. The resumption of steel scrap imports will therefore allow China to utilise global resources and maximise the substitution of iron ore in the steel making process.

In May 2021, the Ministry of Industry and Information Technology has issued the "Guiding Opinions on Promoting the High-Quality Development of the Iron and Steel Industry (Draft for Comment)" which targets the steel sector to have completed the transition to ultra-low emission of over 80% by 2025, and all enterprises in key regions will complete this ultra-low emission transformation.

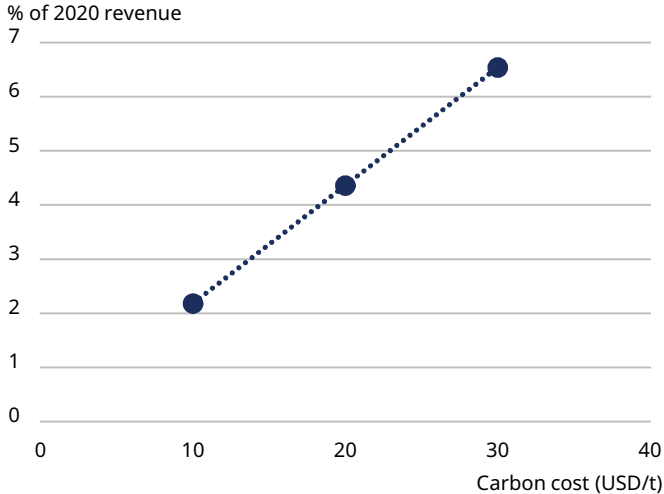
The National Energy Administration has also released a [policy paper](#) on decarbonising China's steel industry and is proposing the following measures:

- Reduce the absolute production of crude steel output in 2021.
- Reduce exports of low value adding steel exports.
- Increase the proportion of short-process steel smelting.
- Shifting production (largely in the North) closer to end-markets (largely in the South).
- Increase the application of high-strength steel and reduce the total amount of steel used.

ETS developments

We expect the introduction of an ETS for the steel sector to take place by the middle of this decade to give the sector more time to prepare and for decarbonisation pathways to be clearer. At this stage, we perform a sensitivity analysis where we find the steel sector to be less affected amongst heavy industrial sectors to a rising carbon cost, with the imposition of each USD10/t to carbon emissions to represent 2% of sector revenue.

Figure 20: China steel sector revenue sensitivity to carbon cost (2020)



Company implications

In response to the national climate targets, China's largest steel maker, Baowu Steel Group, has committed to become achieve an emissions peak in 2023, reducing emissions by 30% by 2035 and reaching carbon neutrality by 2050. The other large listed steel companies have not yet announced detailed plans to decarbonise and some do not even disclose their emissions.

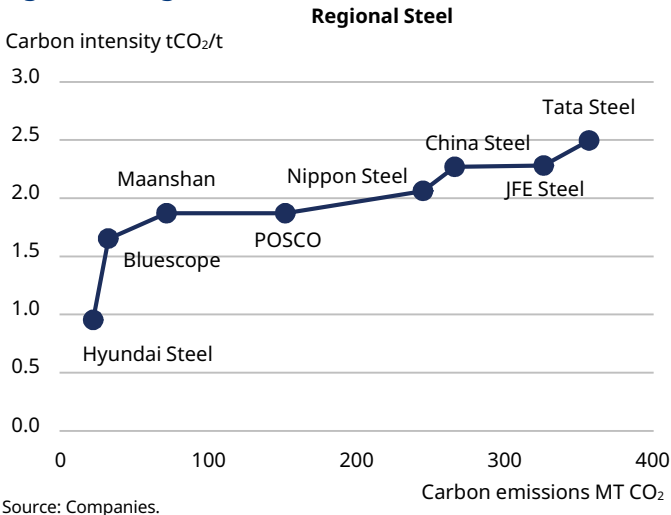
Based on our scenario analysis presented in the table below, we observe that the large Chinese steel companies would see a significant impact on profitability.

Figure 21: China steel scenario analysis

Company	USD10/t carbon cost impact on 2020 NP (%)
Angang ¹	153
Maanshan	131
Shangang ¹	287

¹Carbon emissions are estimated based on 1.9tCO₂/MT of CS.
Source: Companies, AIGCC estimates.

Figure 22: Regional steel carbon curve (2020)





Background

Figure 23: Aluminium key indicators (2020)

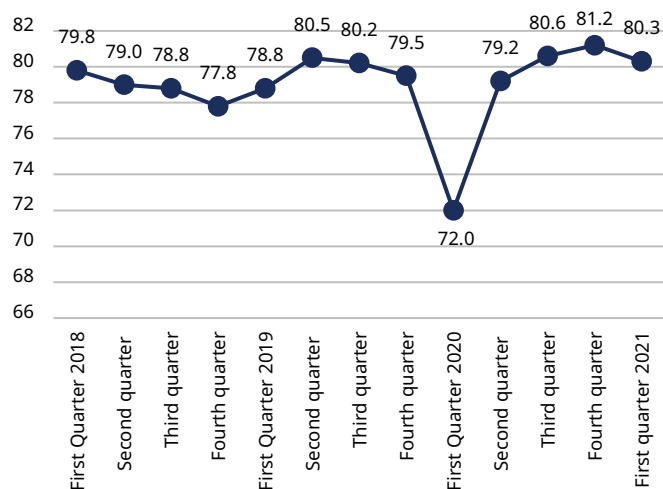
Revenue (RMB tr)	Profits (RMB tr)	Emissions (G T)
NA	NA	0.52

Source: CEIC, AIGCC estimates.

Revenue and profits for aluminium are unavailable. As an indication, CEIC reports 2020 revenue and profit figures for non-ferrous metals smelting (including aluminium) as 5.56 and 0.15 RMB tr respectively.

In 2020, China produced 37.3Mt of primary aluminium, accounting for 57% of global aluminium production, consuming 71 Mt of alumina feedstock and 13MWh per tonne of aluminium. China's aluminium production is heavily dependent on coal-fired power which accounts for 88% of the power mix with 65% of the electricity used coming from self-generating units. In 1Q21, the utilisation rate of non-ferrous metal smelting and processing industry was 80.3%, a 8.3ppt increase y-y.

Figure 24: Quarterly utilisation rate of non-ferrous metal smelting and processing industry (%)



Source: NBS.

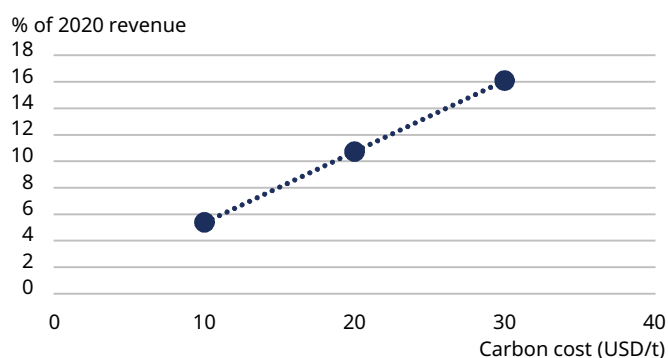
China's reliance on coal-fired electricity for aluminium production is the key factor behind the high carbon intensity of this industry. Unlike other large emitting sectors like energy and steel, progress in decarbonising the aluminium sector is still slow. Though 2.5GW of subcritical captive coal capacity in Shandong's aluminium sector was closed in 2020, China still has over 44 GW of subcritical captive coal capacity used in aluminium production.

Large aluminium companies have taken the initiative in raising their proportion of renewable power. Notably, [China Hongqiao](#) and [Chalco](#) have been relocating production capacity to Southwest provinces to take advantage of the hydropower. We believe this trend will continue given Beijing's long-term commitment to reduce coal-powered aluminium smelters in the northeast while the falling costs of renewables should provide a further boost.

ETS developments

We expect the introduction of an ETS for the aluminium sector to take place by the middle of this decade to give the sector more time to prepare and for decarbonisation pathways to be clearer. At this stage, we perform a sensitivity analysis where we find the aluminium sector to be moderately affected amongst heavy industrial sectors to a rising carbon cost and estimate the imposition of each USD10/t to carbon emissions to represent 6% of sector revenue.

Figure 25: China aluminium sector revenue sensitivity to carbon cost (2020)



Source: IHS.

Company implications

China's aluminium sector has made progress in cutting carbon emissions in recent years, with Chalco and Hongqiao cumulatively reducing carbon emissions by 13% y-y in 2019. Chalco is still formulating its long-term plan to decarbonise and Hongqiao has committed to utilising more hydro and solar power.

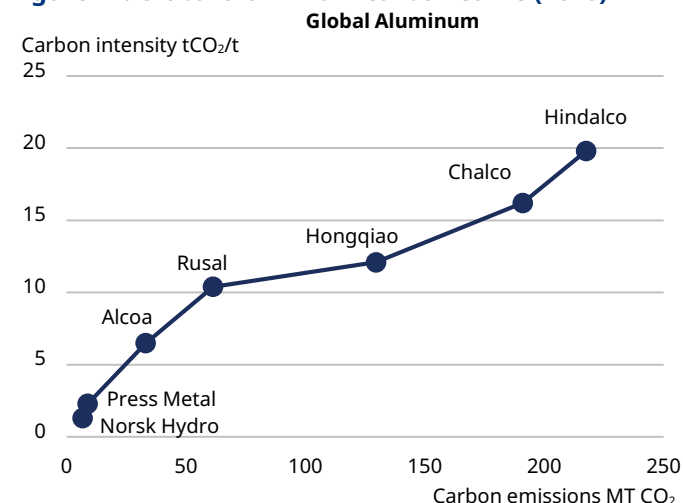
Based on our scenario analysis presented in the table below, we observe that the large Chinese aluminium companies would see a significant and varied impact on profitability.

Figure 26: China aluminium scenario analysis

Company	USD10/t carbon cost impact on 2020 NP (%)
Chalco	781
Hongqiao	42

Source: Companies, AIGCC estimates.

Figure 27: Global aluminium carbon curve (2020)



Source: Companies.



Background

Figure 28: Chemicals key indicators (2020)

Revenue (RMB tr)	Profits (RMB tr)	Emissions (G T)
6.31	0.42	0.65

Source: Industry source, Citibank estimates.

In 2019, China produced 47.5 Mt of ammonia, 56 Mt of methanol and 20 Mt of PVC accounting for 26%, 60% and 44% of global production, [respectively](#). Ammonia is largely used to produce urea, methanol has a wide variety of uses in industry, transport, and chemicals (via the methanol-to-olefins process) and PVC is a versatile material used in window frames, pipes and cable insulation.

For other key chemicals, China's production is less dominant, but is expected to grow in the coming years, led by continued strong export growth, rising income levels and growth of e-commerce. By 2030, [Globaldata](#) forecasts China to have the largest global ethylene capacity in the world with a 26% share.

China's chemical industry has a significantly higher degree of dependence on coal feedstock which emits significantly higher emissions compared to oil or gas-based production. Altogether, we estimate that the 6 major coal-based chemicals are responsible for almost 600 MT of CO₂ at present.

Figure 29: China's coal-chemical industry (2019)

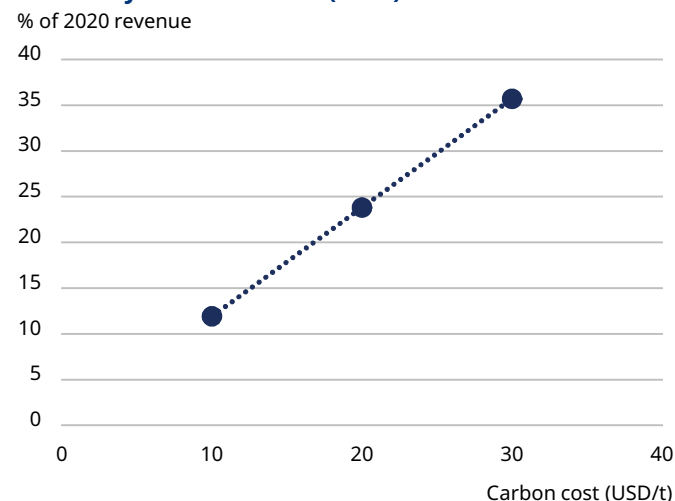
	Capacity m tpa	Op rate %	Production m t	Intensity tCO ₂ /t	Emission m t CO ₂ e
Coal-to-carbide	40	65	26	1.9	49
Coal-to-ammonia	85	55	47	4.4	208
Coal-to-methanol	80	65	52	4.3	224
Coal-to-olefins	7.2	70	5.0	12.0	60
Methanol-to-olefin	6.3	60	3.8	2.8	11
Coal-to-MEG	5.1	60	3.0	10.5	32
Total	223.5		136.6		583.3

Source: [Applied Energy](#) (Dec 2018).

ETS developments

We expect the introduction of an ETS for the chemical sector to take place by the middle of this decade to give the sector more time to prepare and for decarbonisation pathways to be clearer. At this stage, we perform a sensitivity analysis where we find the coal-chemical sector to be heavily affected amongst heavy industrial sectors to a rising carbon cost and estimate the imposition of each USD10/t to carbon emissions to represent 12% of sector revenue.

Figure 30: China coal-chemical sector revenue sensitivity to carbon cost (2020)



Source: Companies.

Company implications

Carbon emissions from China's chemical sector has continued to rise in recent years due to rising production and the startup of more coal-based production, particularly coal-to-MEG. To-date, there are no concrete plans in the sector to fully decarbonise, with Shanghai Petchem announcing the most ambitious plan so far of achieving carbon peaking during the 15th Five-year plan.

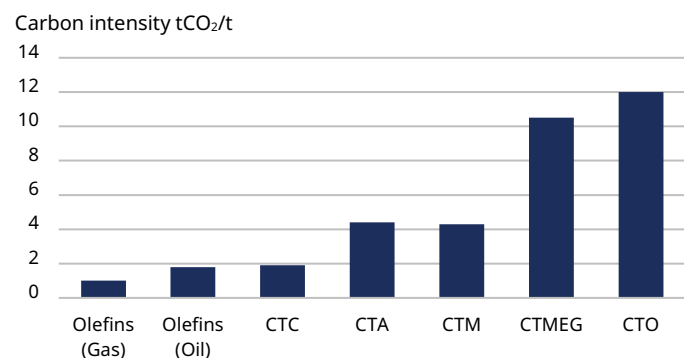
Based on our scenario analysis presented in the table below, we observe that the HK-listed Chinese chemicals companies would see a significant but varying impact on profitability.

Figure 31: China chemicals scenario analysis

Company	USD10/t carbon cost impact on 2020 NP (%)
China BlueChem	58
Shanghai Petchem	115
China Sanjiang	13

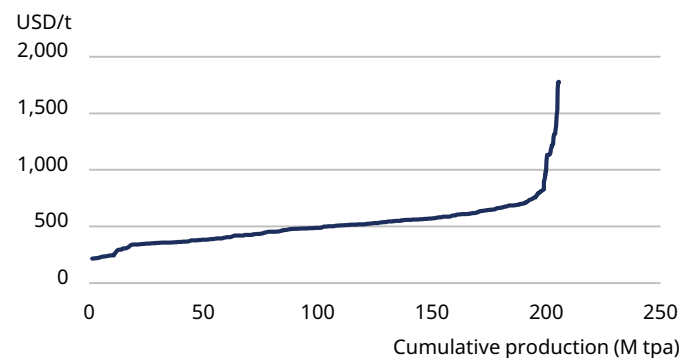
Source: Companies, AIGCC estimates.

Figure 32: Carbon intensity comparison



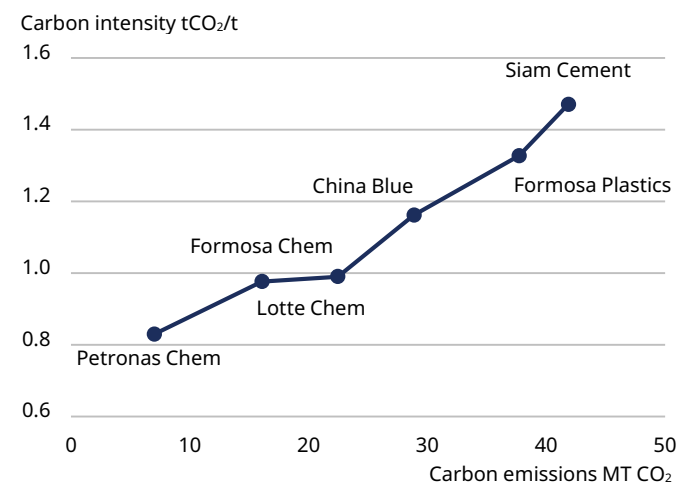
Source: IHS, Applied Energy.

Figure 33: Global ethylene cost curve (2021)



Source: IHS.

Figure 34: Regional chemicals carbon curve (2020)



Source: Companies.

Cement – cleaner inputs required



Background

Figure 35: Cement key indicators (2020)

Revenue (RMB tr)	Profits (RMB tr)	Emissions (G T)
1.00	0.18	1.78

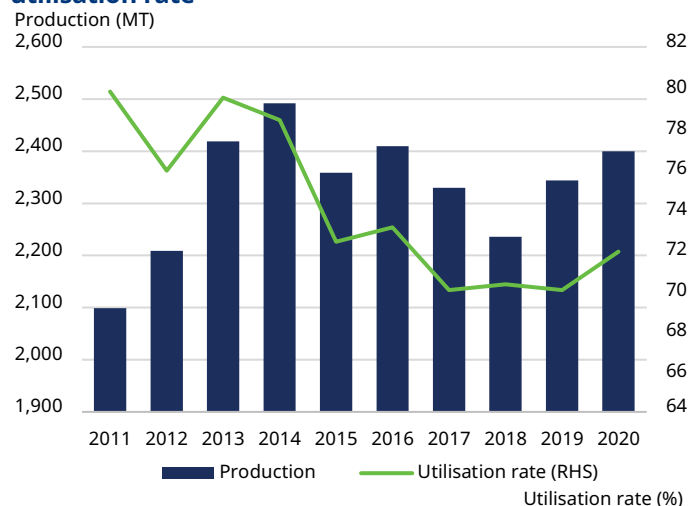
Source: Industry associations.

In 2020, China's cement production capacity reached [1.83Bt/yr](#) and [26 new integrated](#) production lines were built with a clinker production capacity of around 40Mt/yr. At present, the China Cement Association estimates there are 3,400 cement companies in China of which two thirds are independent cement grinding companies. However, due to the many recent mergers, China's top ten cement producers now have a national market share of around 60%, allowing utilisation rates in the sector to have stabilised in recent years.

The government's recent attempts to consolidate the cement industry include:

- In 2018, the [Ministry of Industry and Information Technology \(MIIT\)](#) announced a complete ban on new capacity and that any new cement-making projects that are 'absolutely necessary' must follow replacement capacity rules, to ensure that total production capacity will only reduce.
- In December 2020, the [MIIT released stricter draft regulations](#) for the decommissioning of old production capacity before they build new capacity. Under the new regulation, for areas classified as environmentally sensitive, cement companies must retire at least two tonnes of obsolete capacity for each tonne of proposed

Figure 36: China cement sector production and utilisation rate



Source: NBS.

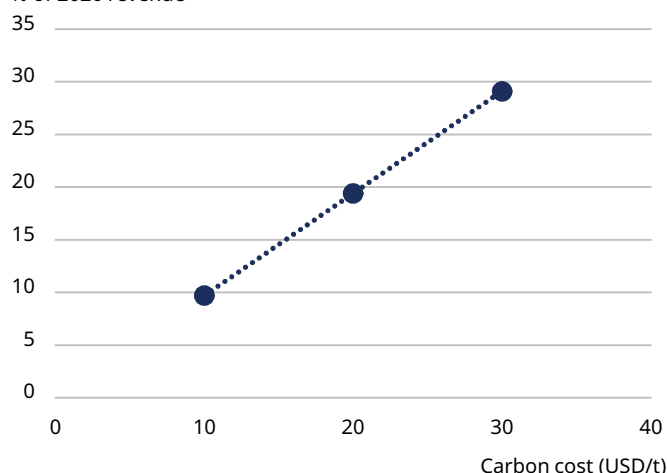
new capacity. The current ratio is 1.5:1. As for non-environmentally sensitive areas, companies need to retire at least 1.5 tonnes of outdated capacity for every tonne of new capacity, an increase from its current 1.25:1 ratio. Although the date of implementation for the new rule has yet to be determined, companies should start reassessing any new capacity projects to align to the stricter regulations.

ETS developments

We expect the introduction of an ETS for the cement sector to take place by the middle of this decade to give the sector more time to prepare and for decarbonisation pathways to be clearer. At this stage, we perform a sensitivity analysis where we find the cement sector to be heavily affected amongst heavy industrial sectors to a rising carbon cost and estimate the imposition of each USD10/t to carbon emissions to represent 10% of sector revenue.

Figure 37: China cement sector revenue sensitivity to carbon cost (2020)

% of 2020 revenue



Source: Companies.

Company implications

China's cement sector has continued to see a gradual rise in carbon emissions in the past few years in-line with the gradual increase in production. To-date, there are no concrete plans to fully decarbonise the sector due to the lack of a viable pathway. CR Cement is piloting new

techniques such as alternative clinker (eg. Calcined clay) and alternative fuel (eg. Biomass), but these are only partial solutions at best.

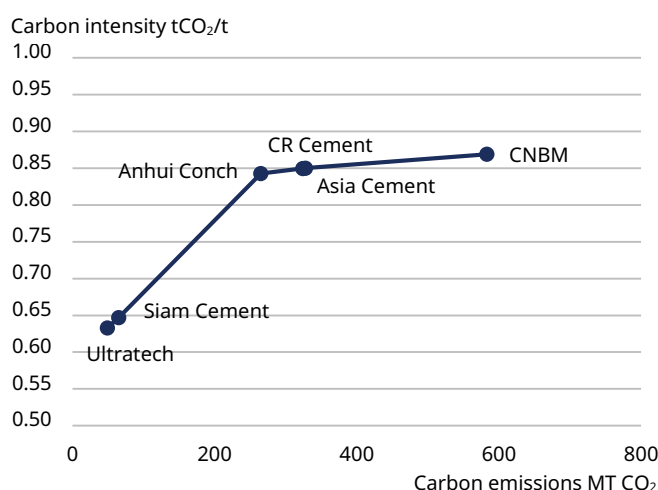
Based on our scenario analysis presented in the table below, we observe that the HK-listed Chinese chemicals companies would see a significant but varying impact on profitability.

Figure 38: China Chemicals Scenario Analysis

Company	USD10/t carbon cost impact on 2020 NP (%)
CNBM	132
CR Cement	43
Anhui Conch	38

Source: Companies, AIGCC estimates.

Figure 39: Regional cement carbon curve (2020)



Source: Companies.

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